Artistry in Sound ONKYO

M-5090

Super Servo Stereo Power Amplifier

Instruction Manual

ONKYO

WARNING

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

The serial number is written on the rear panel of this unit. Copy the serial number and model number onto your warranty card and keep it in a safe place.

CABINET COMPOSITION

SIDES: EBONY WOOD VENEER
OVER PARTICLE BOARD

For Safety

Please read the following safety instructions before using this unit.

1. Read Instructions – All the safety and operating instructions should be read before the unit is operated.

2. Retain Instructions – The safety and operating instructions should be retained for future reference.

3. Heed Warnings – All warnings on the unit and in the operating instructions should be adhered to.

4. Follow Instructions – All operating and use instructions should be followed.

5. Water and Moisture – The unit should not be used near water – for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.

6. Carts and Stands – The unit should be used only with a cart or stand that is recommended by the manufacturer.

7. Wall or Ceiling Mounting – The unit should be mounted to a wall or ceiling only as recommended by the manufacturer.

8. Ventilation – The unit should be situated so that its location or position does not interfere with its proper ventilation. For example, it should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

9. Heat - The unit should be situated away from heat sources such as radiators, heat registers, stoves, or other units (including amplifiers) that produce heat.

10. Power-Sources – The unit should be connected to a power supply only of the type described in the operating instructions or as marked on the unit.

11. Grounding or Polarization – Be sure the unit is properly grounded and polarization is correct.

12. Power-Cord Protection – Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the unit.

13. Cleaning – To keep the unit looking like new, wipe the cabinet every now and again with a silicon cloth or other suitable soft material. To remove heavier stains and smears, dip a soft cloth in a weak solution of neutral cleanser, wring out firmly, and then wipe clean. Wipe dry with a separate dry soft cloth. Do not use rough cloth or volatile liquids since these tend to mar the appearance and can even remove panel lettering.

14. Periods of Nonuse – The power cord of the unit should be unplugged from the outlet when left unused for a long period of time.

15. Spillage – Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through the openings.

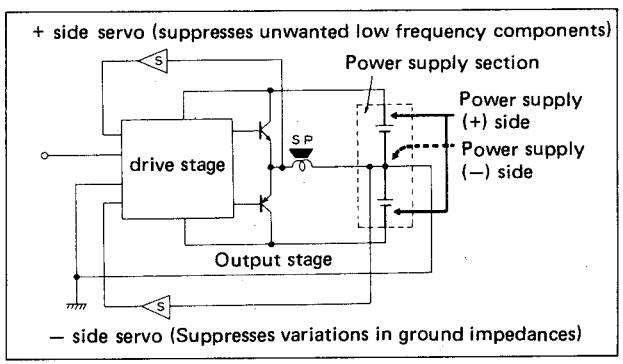
16. Damage Requiring Service – The unit should be serviced by qualified service personnel when:
    A. The power-supply cord or the plug has been damaged; or
    B. Objects have fallen, or liquid has been spilled into the unit; or
    C. The unit has been exposed to rain; or
    D. The unit does not appear to operate normally or exhibits a marked change in performance; or
    E. The unit has been dropped, or the enclosure damaged.

17. Servicing – The user should not attempt to service the unit beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

- This apparatus complies with requirements of EEC directive 76/889/EEC.
- Das Apparat stimmt mit den Bedingungen der EG-Richtlinien 76/889/EWG überein.
- Cet appareil répond aux specifications de la directive CCE 76/889/CEE.
- Dit apparaat voldoet aan de vereisten van EEG-reglementen 76/889/EEG.
- Apparatet opfylder kravene i EF direktivet 76/889/EF.
- Quest'apparecchio é stato prodotto in confornitŕa alle direttive CEE 76/889/CEE.

Features

Super Servo Amplifier for Pure Amplification of Program Source and Elimination of Unwanted Noise Generated Along the Signal Path


+ side servo (suppresses unwanted low frequency components)
Power supply section
Power supply (+) side
Power supply (–) side
drive stage
SP
Output stage
– side servo (Suppresses variations in ground impedances)

As can be seen in the diagram, the servo circuits are connected to both the (+) and (–) outputs of the DC amplifier.

The audible range program signals are passed via the (+) terminal, but are also accompanied by unwanted low frequency components generated within the amplifier as a result of changes in temperature and power supply voltage. These unwanted components subsequently modulate the program signals and thus affect the quality of sound. The servo circuit inserted in the (+) side, however, cancels these unwanted frequency components by a feedback mechanism and thereby plays a significant role in the improvement of sound reproduction quality. The ground feedback circuit in the (–) side would appear at first to be rather meaningless. However, the impedance between the amplifier ground points is not completely zero, and a considerable potential difference is generated between the amplifier input and output ground, depending on how the power supply capacitors and lead wire ground points are arranged. This, too, will affect the quality of sound. By negative feedback of the unwanted low frequency components generated between these ground points, the (–) side servo circuit equalizes the ground potential levels at the input and output points, and thereby short circuits the source of the unwanted frequency components.

Super Servo – Equivalent to Having a 100-times Larger Power Supply – Remarkably Pure and Clear Sound

The larger the power supply section of an amp is, the better its sound quality becomes. In the M-5090, Super Servo has been used to obtain the effect of having a 100-times larger power supply and the resulting benefits. This system features a clearly audible increase in overall perceived power, definition and clarity in the mid and low ranges.

The Principle Behind the 100-times Larger Power Supply

When the hot (signal) side voltage changes due to a weak power supply, it affects the amp's driver section and sound quality suffers. A design improvement in the driver section of the M-5090 and the Super Servo loop at the positive (output) terminal reduce this effect to 1/100. On the negative (grounded) side of the power supply, to which the speakers are directly connected, a fluctuation directly affects the speakers and sound quality deteriorates. Conventional amplifiers use a more massive, low resistance ground connection to deal with this problem. However, since the current is large, the effectiveness of this method is limited. The M-5090 has a second Super Servo loop at the negative (ground) output terminals to reduce the effect of changes in the power supply to 1/100. In this way, Super Servo can reduce deteriorations in sound quality caused by fluctuations in the power section by a factor of 100 at both (+) and (–) speaker terminals. In order to obtain this effect without Super Servo, an overwhelming 100 times larger power supply would be required.

Linear Switching Performance on Par with Class A Power Amplifiers

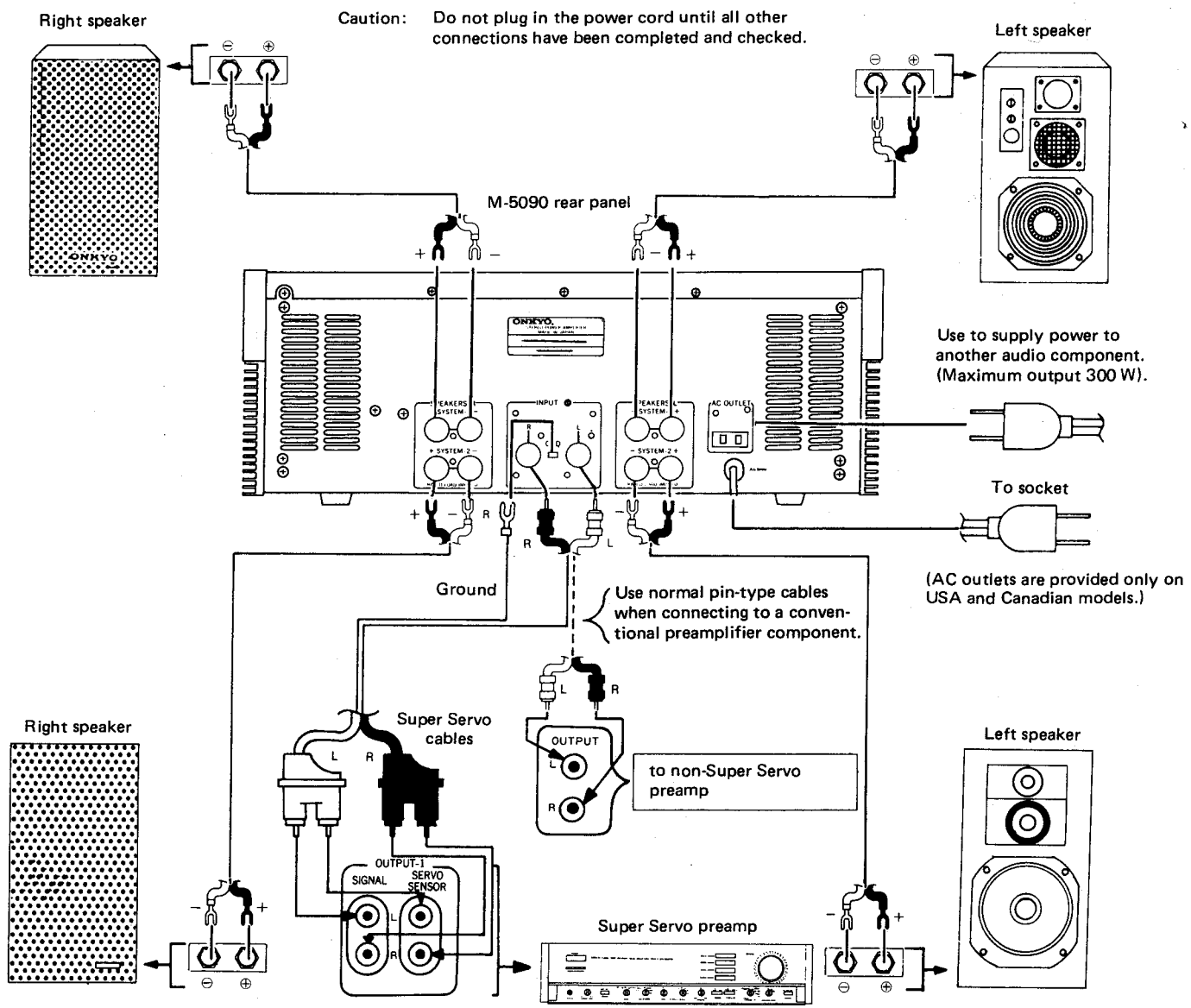
Output transistor operation is usually based on class B or class AB amplifier operation where 2 separate transistors are used in combination. A few amplifiers are based on class A amplifier operation where only a single transistor is required. However, non-linear components are generated rather easily in class B and class AB transistor combinations, resulting in switching distortion which can have a marked effect on the quality of sound. Although this problem is not encountered in the single-transistor class A operation, a very large current has to be applied to bring the operational point back to the center and ensure a strong bias. This results in the generation of large quantities of heat, and since the linear portion of the transistor operation curve cannot be extended very much, it is quite difficult to obtain high level output power from class A amplifiers. Although the linear switching circuit employed in the M-5090 is rather similar in circuit design to the 2-transistor class B amplifiers, a special bias circuit is employed for compensatory purposes at the point of intersection between the characteristic operational curves for the 2 transistors. This ultimately results in the switching circuit operating as if in accordance to a single operation curve of exceptional linearity. In addition, high f_T power transistors are used so that amplification is virtually the same as class A and up to 200 watts can be delivered in each channel.

Extra Large High Speed Peak Meters

The M-5090 has a pair of extremely accurate peak meters capable of indicating momentary output levels to a very high degree of accuracy. This greater accuracy is mainly due to the very large meter drive stage which features an extremely high speed response time and the incorporation of the temperature compensation circuit and logarithmic compression circuit in a monolithic IC. The large size and clear delineations also mean you can read them from a distance.

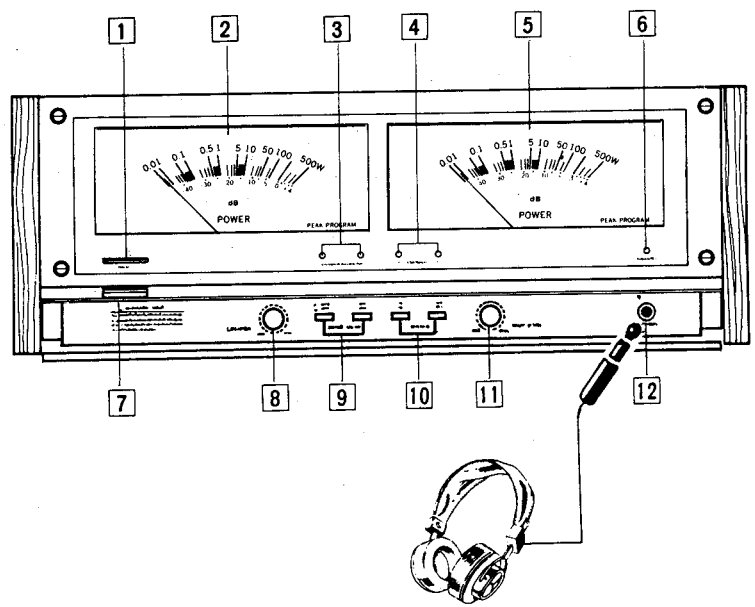
System Connections

- It is recommended that the Onkyo P-3090 preamplifier be used with the M-5090 because the P-3090 features the same Super Servo system.
- In this case, connect the M-5090 and P-3090 to each other with the special Super Servo cables supplied (these cables are supplied only with the P-3090). However, if a different preamplifier is connected to the M-5090, use normal pin-type connecting cables.
- Since the M-5090 is a high grade high power ampliifer component, use only high grade speaker systems capable of doing justice to the excellent quality of sound reproduction achieved by the M-5090.
- Note that although the allowable speaker impedance range is 4 Ω to 16 Ω, the speaker systems selected for use with the M-5090 should have a high power handling capacity. If speaker systems of low maximum input power rating are used and the volume level is increased to very high levels, the speakers will probably be damaged. Check the maximum input power rating before connecting to the M-5090.
- Use sturdy appropriate speaker cables for the speaker connections. The use of thin leads is not recommended because the resultant higher speaker lead impedance will affect the quality of sound reproduction.
- In order to protect speakers from possible damage, always turn the M-5090 power switch off before connecting (or disconnecting) the speaker systems.
- Be particularly careful not to short circuit the speaker cables at any time.
- Keep the power cord away from the pin-type cables and speaker cables since close proximity can result in induction hum.

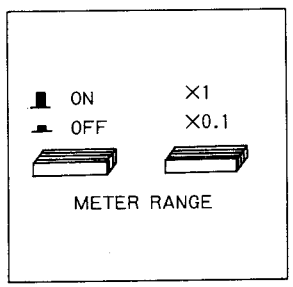

Right speaker
Caution: Do not plug in the power cord until all other connections have been completed and checked.
Left speaker
M-5090 rear panel
Use to supply power to another audio component. (Maximum output 300 W).
To socket
(AC outlets are provided only on USA and Canadian models.)
Ground
Use normal pin-type cables when connecting to a conventional preamplifier component.
Super Servo cables
OUTPUT
to non-Super Servo preamp
Right speaker
Left speaker
OUTPUT-1
SIGNAL
SERVO SENSOR
Super Servo preamp

Front Panel Facilities

Before turning power on for the first time, turn the level controls [8] [11] all the way to the right, turn the volume control on the pre-amp to its minimum setting, and confirm that both needles are pointing at '0'.
When power is turned on, both meters will be illuminated by a gentle red light. After a short time, the illumination will change to a normal lamp and the SERVO OPERATION indicator [6] will light up.
Begin operation of the desired audio source and slowly raise the pre-amp volume control to the desired listening level.
Note that no sound will be produced while the SERVO OPERATION indicator [6] is not lit because the transient killer is operating during this time.

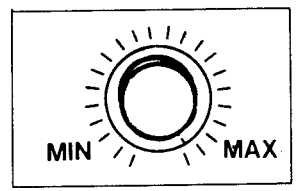


Using the Meter Range Selector Switches
Use these switches to turn the power meters on and off and to select the sensitivity. When the left selector is ON (▮) and the right selector is in the X0.1 (▬) position, the meter sensitivity is increased by 10 times. For example, if the meters show 100 watts of output, the actual output power at that time is 10 watts. When the right selector is in the X1 (▮) position, the meters show the actual output power. The meter range indicators [3] light to clearly show which mode has been selected. You should use the setting in which the needles do not deflect beyond the end of the scales. If the right selector is OFF (▬), the meter needles will not move at all.

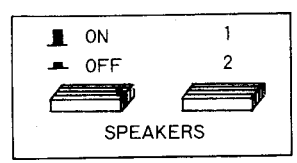


[1] **Power indicator**
[2] **Left channel power meter**
[3] **Meter range indicators**
[4] **Speaker output indicators**
[5] **Right channel power meter**
[6] **Servo operation indicator**
[7] **Power switch**
[8] **Left channel level control**
[9] **Meter range selector switches**
[10] **Speaker output selector switches**
[11] **Right channel level control**
[12] **Headphone jack**

Using the Level Controls
This unit has two level controls to permit separate adjustment of each stereo channel. Normally, both controls should be turned all the way to the right (MAX.). If one speaker is much louder than the other due to your listening position or the speaker placement, adjust the level controls [8] [11] to obtain the proper balance between the speakers.



Using the Speaker Output Selector Switches
Depress the left selector to the OFF (▬) position to shut off the output to all speakers. Depress the right selector (▮) to use only the speaker system connected to the SYSTEM 1 terminals on the rear panel of the M-5090. When the right selector is in the IN (▬) position, only the SYSTEM 2 speakers are heard. The speaker output indicators light to clearly show which system is being used.



Protection Circuits

Since the M-5090 is a high output power amplifier, the protective circuitry plays a very important role in protecting the speaker systems and M-5090 from damage. The M-5090 has a relay in the speaker output section that is activated to shut off all output when an abnormal situation occurs. When the relay is activated, the power meter illumination switches back to red and the SERVO OPERATION indicator goes out. If this happens, turn off the power switch immediately and locate the cause of the problem. In order to operate without intefering with the normal operation of the M-5090, the protective relays use low resistance silver contacts. A few moments after power has been turned on, you will hear a soft clicking sound. This means the unit is in the operational status.
The protective relay will be activated in the following cases:

When an excessive current is applied to the speaker terminals
If an excessive current should appear at the speaker terminals, the protector relay will initially switch on and off about three times and then finally switch off altogether indicating that trouble has occurred.
The problem might be due to short circuiting of the speaker cables, or it might be a result of the output power being increased when speakers of low impedance have been connected. In any case, turn the power switch off immediately, determine the cause, and rectify accordingly.

When a DC voltage is applied to the speaker terminals
Since the M-5090 is a DC amplifier incorporating the Super Servo system, DC voltages are not normally generated by the amplifier itself. However, if a failure occurs in the amplifier resulting in the appearance of a DC voltage at the output terminals, such a voltage could damage the speakers (since in terms of electric circuits,speakers consistsof no more than a coil where the DC impedance is very low) by causing excessive heat. Hence, as soon as a DC voltage is detected, the relay is activated, thereby cutting the speakers from the amplifier.

Although the left and right channels are completely separated from each other in the M-5090, both channels will be cut automatically even if trouble arises in only one channel.
Note that the sound is always muted for the first few seconds after turning the power switch on - it is not a malfunction of the unit.
Some preamplifiers and tape decks have been found to generate "pop" noises when the power is turned on, and if connected to the M-5090, such pop noises could activate the protector circuit. In this case, always turn the M-5090 power switch on last after the other components.

Trouble-shooting Guide

If the M-5090 fails to function normally, first check the following points before calling the service repairman.
If, after completing the checks, the problem still persists or is of a different nature, unplug the power cord from the socket and contact your nearest Onkyo Service Station.

1. **No power**
   Check that the power switch [7] has been turned on, and that the power cord has been properly plugged into the socket. Also note that when the power cord is plugged into one of the power outlets (switched) on the rear panel of the preamplifier, the preamplifier power must also be turned on. (Rear panel power outlets are provided only on USA and Canadian models.)

2. **No sound when power turned on**
   Check that the speaker cables and the pin-type connecting cables have been properly connected. Then check that there is an input signal from the preamplifier. The speaker output selector must also be in the correct position. If the protector circuit has been activated (indicated by the power meter light and speaker indicator lamp), turn the power switch off immediately, locate the problem, and rectify accordingly.

3. **Generation of hum, howling, or other noise**
   Connect a ground lead. Also keep the input connector cables well away from the power cord and power transformer since these are possible sources of interfering induction noises.

Specifications

Power Output:	200 watts per channel, min. RMS, at 8 ohms both channels driven, from 20 Hz to 20 kHz, with no more than 0.01% total harmonic distortion 210 watts per channel, into 8 ohms at 1 kHz, 0.01% THD
Total Harmonic Distortion:	0.01% at Rated power 0.01% at 1 watt output
Intermodulation Distortion:	0.01% at Rated power
Frequency Response:	+0, −1.5 dB at 1 Hz ~ 100 kHz
Input Sensitivity:	1.5 V
Input Impedance:	47 k ohms
Damping Factor:	200 (8 ohms, 1 kHz)
Signal to Noise Ratio:	94 dB (IHF A-202)
Power Supply Rating:	AC 120 V 60 Hz, AC 220 V 50 Hz
Outputs:	SPEAKERS 1 & 2, AC OUTLET, PHONES
Inputs:	INPUT
Semiconductors:	4 FETs, 82 Transistors, 85 Diodes, 7 ICs
Dimensions:	480(W) x 191(H) x 439(D) mm 18 57/64" x 7 33/64" x 17 9/32"
Weight:	31 kg. (68.3 lbs.)

Specificatins and features are subject to change without notice.